A & H Enterprises, Inc.
11812 NE 116th Street
Kirkland, WA 98034 USA
TEL: +425.883.4040
FAX: +425.823.1962
www.amflow.com
EMAIL: ah@amflow.com

INSTALLATION & SERVICE MANUAL

AMFLOW® PR-HF-SSSP
Back Pressure Regulator

Part Number: 00001100-0501

NOTE
Reference the "As Built" data sheet supplied with order for specific back pressure regulator configuration.

Explanation of Graphic Symbols

DANGER AND/OR WARNING
The exclamation point within an equilateral triangle surrounded by red is intended to alert the user to the presence of important operating and maintenance instructions that may cause personal injury or harm to the system.

CAUTION AND/OR IMPORTANT
The exclamation point within an equilateral triangle that is solid yellow with an exclamation point is intended to alert the user to use caution or contains important information.

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

TABLE OF CONTENTS

SECTION 1: INFORMATION **3**
1.01 DESCRIPTION 3
1.02 DESIGN FEATURES 3
1.03 SAFETY INFORMATION 3
1.04 GA DRAWING 4
1.05 CUT-AWAY VIEW 5
1.06 EXPLODED VIEW 6
1.07 BOM 7
1.08 CUT-AWAY VIEW: Panel Mount 8
1.08a PANEL MOUNT: Cut-out Dimensions 9
SECTION 2: INSTALLATION **10**
2.01 INSTALLATION PROCEDURE: Panel Mount 10
2.02 INSTALLATION PRECAUTIONS 11
SECTION 3: OPERATION **12**
SECTION 4: MAINTENANCE **13**
4.01 DISASSEMBLY: Back Pressure Regulator 13
4.02 REMOVAL: Seat Sub-Assembly 16
4.03 SERVICE: Seat Sub-Assembly 17
4.04 REPLACEMENT: Stem Cup Seal and Stem Rub Washer 19
4.05 SERVICE: Pin Sub-Assembly 20
4.06 RE-ASSEMBLY: Back Pressure Regulator 21
SECTION 5: TROUBLESHOOTING **22**
APPENDIX A **23**
STANDARDS & CERTIFICATIONS **24**
LIMITED WARRANTY **25**

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

SECTION 1: INFORMATION

1.01 DESCRIPTION

The ***Amflow®*** PR-HF-SSSP Back Pressure Regulator has a high flow adjustable pressure regulation from 1000 PSI (69 bar) to 13,500 PSI (931 bar).

The ***Amflow®*** PR-HF-SSSP Back Pressure Regulator is designed to be panel mounted with a minimum thickness of 2 mm. The mounting hole should be from 46 mm to 50 mm in diameter.

1.02 DESIGN FEATURES

- Construction: 316L Stainless Steel
- Operating Pressure: 69-bar (1000 PSI) to 931-bar (13,500 PSI)
- Operating Temperature: -15°C (5°F) to 200°C (392°F)
- Standard Inlet & Outlet Ports: SF750CX
- Weight: 18.5 lbs. (8.4 Kg)
- Ceramic components for high pressure control
- Low maintenance
- Variable rate spring stack allows flexibility in manufacturing configuration depending upon pressure range requirements.
- Unnecessary to change springs for any pressure within the back pressure regulators' operating range.

1.03 SAFETY INFORMATION

⚠ SAFETY INFORMATION

Usage

- Use only within range of pressure and temperature conditions indicated on product data sheet.
- Do not use with chemicals which are incompatible with 316SS or with seal materials.
- Equipment is certified hazardous for Group 2 Category II.
- Equipment should not be used in systems requiring a higher level of certification.

Faults and Damage

The safety features and integrity may be compromised by any of the following:

- External damage to body
- Exposure to pressure loads in excess of maximum rated pressure
- Maintenance performed by improperly trained personnel

Protection from Pressure Releases

- To avoid injury due to release of high pressure, use only 3/4" medium pressure coneal adaptors and fittings rated to withstand appropriate pressure.

> ⚠ **WARNING**:
>
> Permanent damage may occur if proper adaptors and fittings are not used!

- Confirm that all adaptors and fittings are securely connected.
- To avoid a violent release of pressure, slowly bleed off pressure before attaching or removin from pressure line.

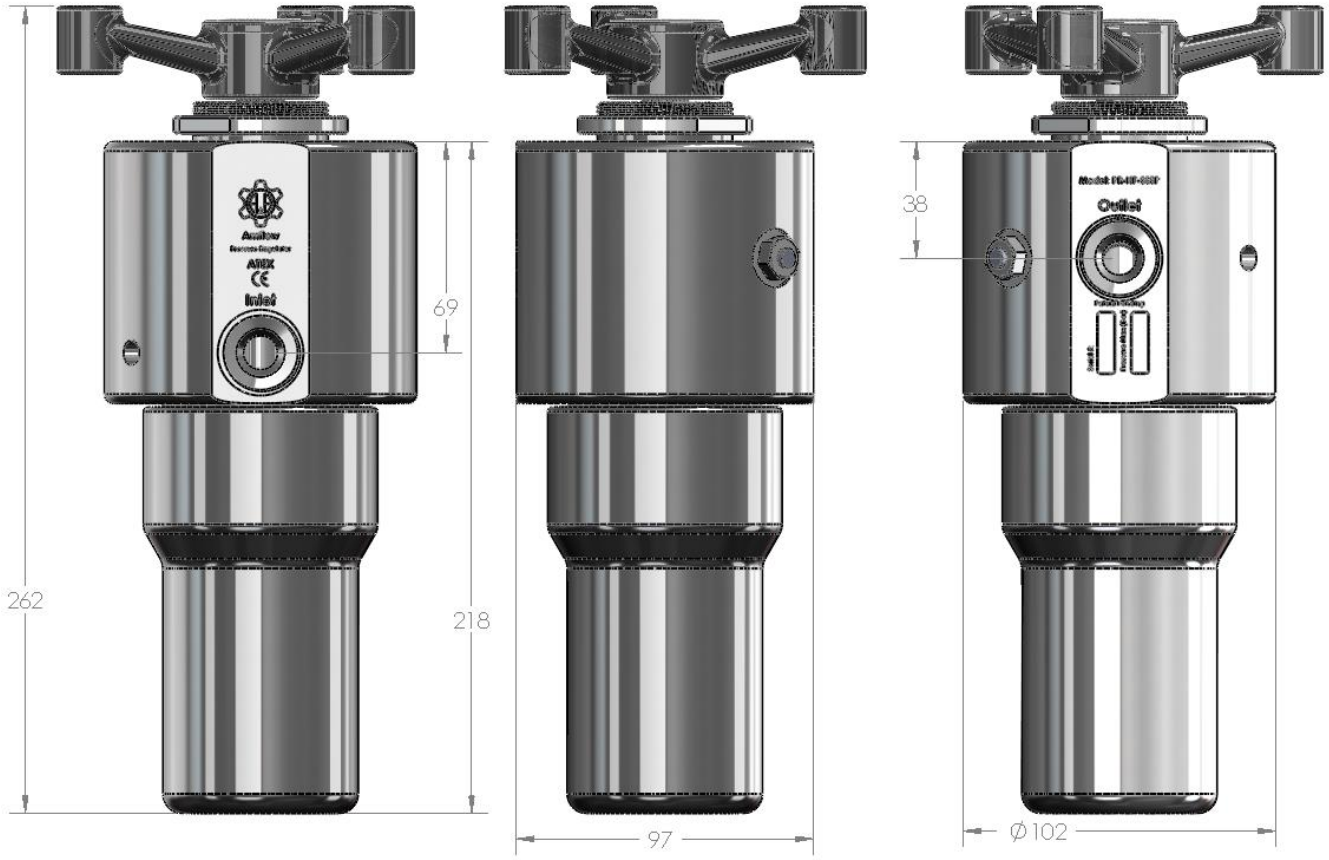
Avoid Mechanical Damage

- Caution must be observed not to damage any threaded components during maintenance procedure. Such damage could compromise the pressure safety factor of back pressure regulator.
- When replacing seals, care must be used to avoid damage to sealing surfaces. Damage could lead to a sudden release of pressure during operation.

END OF SECTION

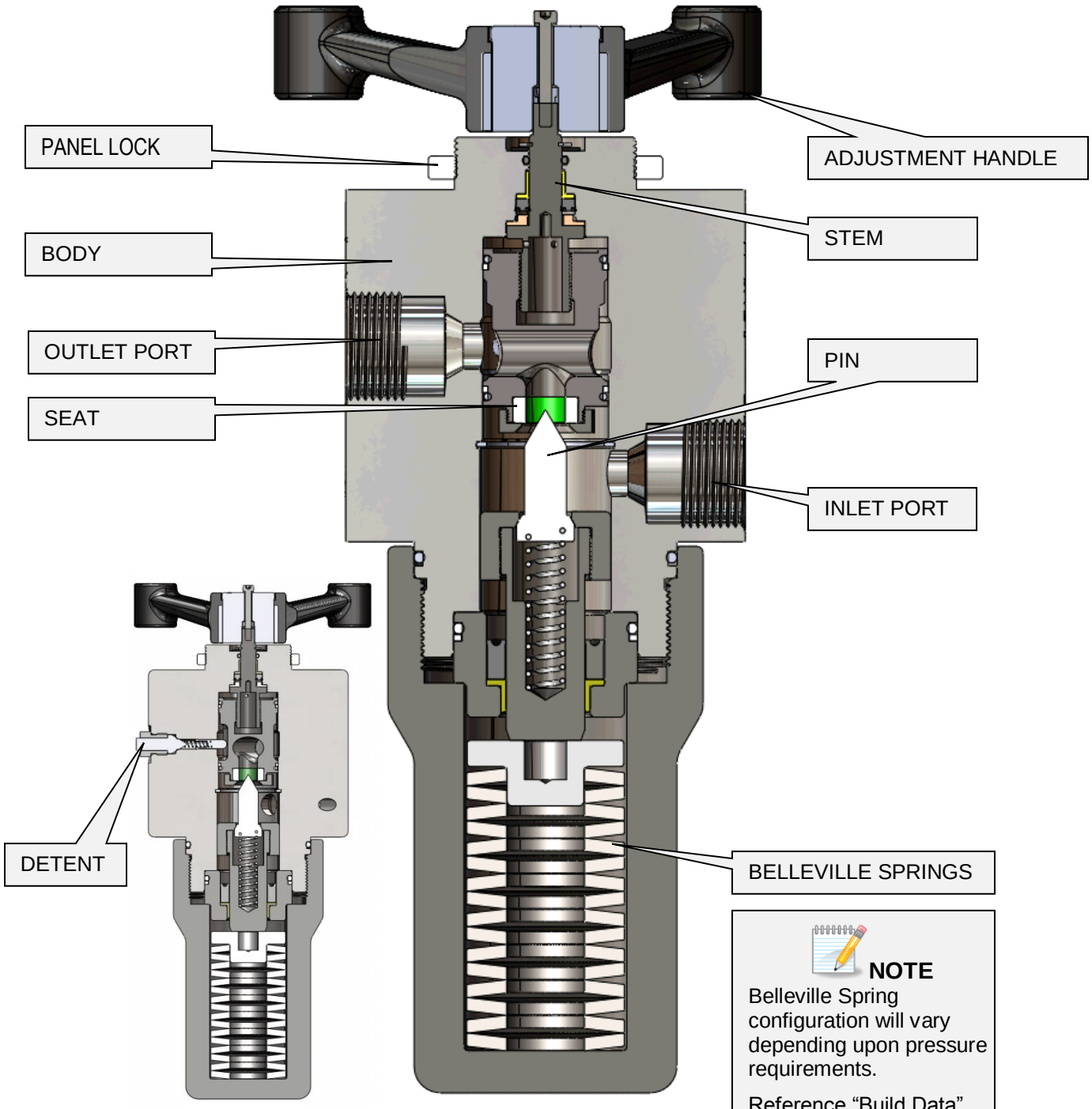
Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

1.04 GA DRAWING



Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

1.05 CUT-AWAY VIEW



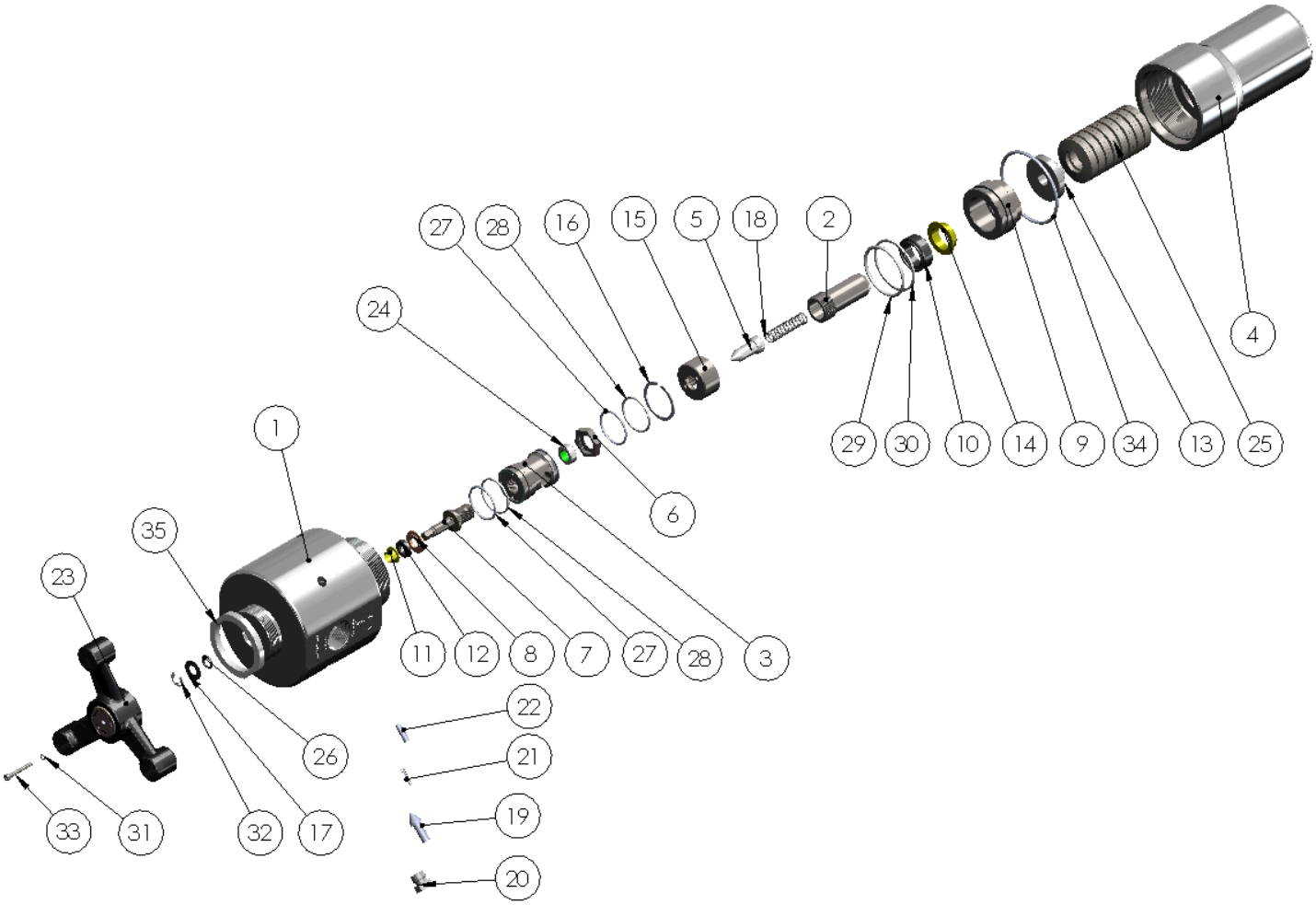
NOTE

Belleville Spring configuration will vary depending upon pressure requirements.

Reference “Build Data” information supplied with order for specific configuration.

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

1.06 EXPLODED VIEW



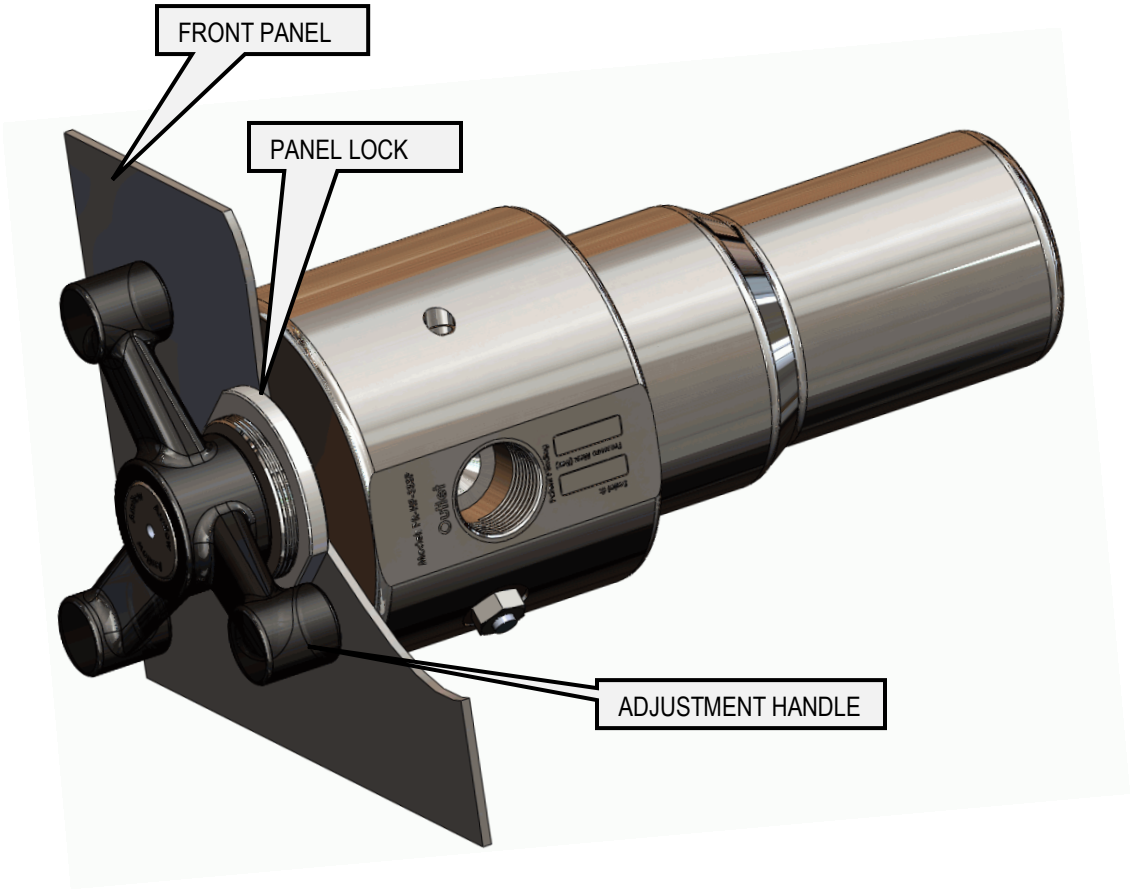
Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

1.07 BOM

ITEM #	PART #	DESCRIPTION	QTY
1	00001101-0301-000	Body	1
2	00001102-0301-000	Piston	1
3	00001107-0301-000	Seat Holder	1
4	00001110-0301-000	Spring Cap	1
5	00001091-0301-000	Pin	1
6	00001108-0301-000	Seat Retainer	1
7	00001109-0301-001	Stem	1
8	00000005-0301-000	Stem Rub Washer	1
9	00001111-0301-000	Cartridge	1
10	00000579-0301-000	Piston Cup Seal	1
11	00001076-0301-000	Stem Bushing	1
12	00000009-0301-000	Stem Cup Seal	1
13	00000210-0301-000	Spring Cup	1
14	00001112-0301-000	Piston Bushing	1
15	00001104-0301-000	Pin Retainer	1
16	00001113-0301-000	Stop Ring	2
17	00000272-0301-000	Clip Washer	1
18	00001120-0301-000	Pin Spring	1
19	00001355-0301-000	Plug, Cone - Autoclave .25	1
20	00001356-0301-000	Retainer, Autoclave CGLx40 r	1
21	00001159-0301-000	Detent Spring	1
22	00001360-0301-000	Detent	1
23	00000560-0401-001	Adjustment Handle	1
24	00001092-0301-XXX	Seat	1
25	00001600-1500-125-00-0770	Belleville Spring	16
26	00001555-2011-000	Stem O-Ring	1
27	00001555-2023-109	Seat Holder O-Ring	2
28	00001555-8023-003	Seat Holder Back-Up Ring	2
29	00001555-2129-109	Cartridge O-Ring	1
30	00001555-8129-003	Cartridge Back-Up Ring	1
31	00001500-8003-000-00	M3 Lockwasher	1
32	00000273-0301-000	Stem Clip	1
33	00001500-7003-025-00	M3x25 SHCS	1
34	00001555-2137-000	Body O-Ring	1
35	00000862-0301-000	Panel Lock	1

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

1.08 CUT-AWAY VIEW: Panel Mount



Cutaway view of ***Amflow®*** PR-HF-SSSP Back Pressure Regulator Panel Mount Installation

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

1.08a PANEL MOUNT: Cut-out Dimensions

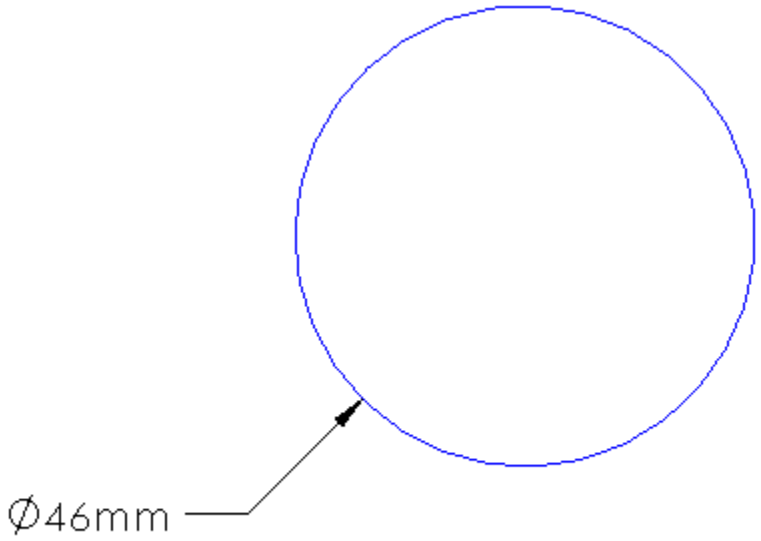


DIAGRAM 1: PR-HF-SSSP Mounting Panel Opening

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

SECTION 2: INSTALLATION

2.01 INSTALLATION PROCEDURE: Panel Mount

ADJUSTMENT HANDLE		
23	00000560-0401-001	Adj. Handle
33	00001500-7003-025-00	M3 x 25 SHCS
35	00000015-0301-000	Panel Lock

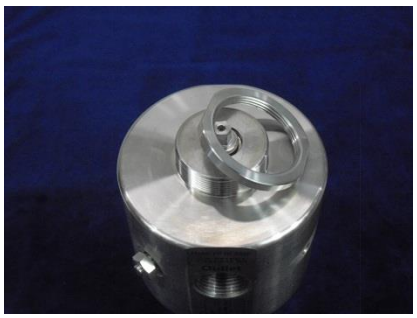
Step 1

- Remove ADJUSTMENT HANDLE (Item 23) from back pressure regulator by unscrewing the M3 x 25 SHCS (Item 33) located in center of ADJUSTMENT HANDLE (Item 23). Ref. PICTURE 1

PICTURE 1

Step 2

- Unscrew PANEL LOCK (Item 35) from threaded neck of BODY (Item 1). Ref. PICTURE 2 & 3



PICTURE 2

PICTURE 3

Step 3

- Place back pressure regulator into 46-50 mm hole of mounting panel.
  - (Ref. Section 1.08)

Step 4

- Replace PANEL LOCK (Item 35) and ADJUSTMENT HANDLE (Item 23).

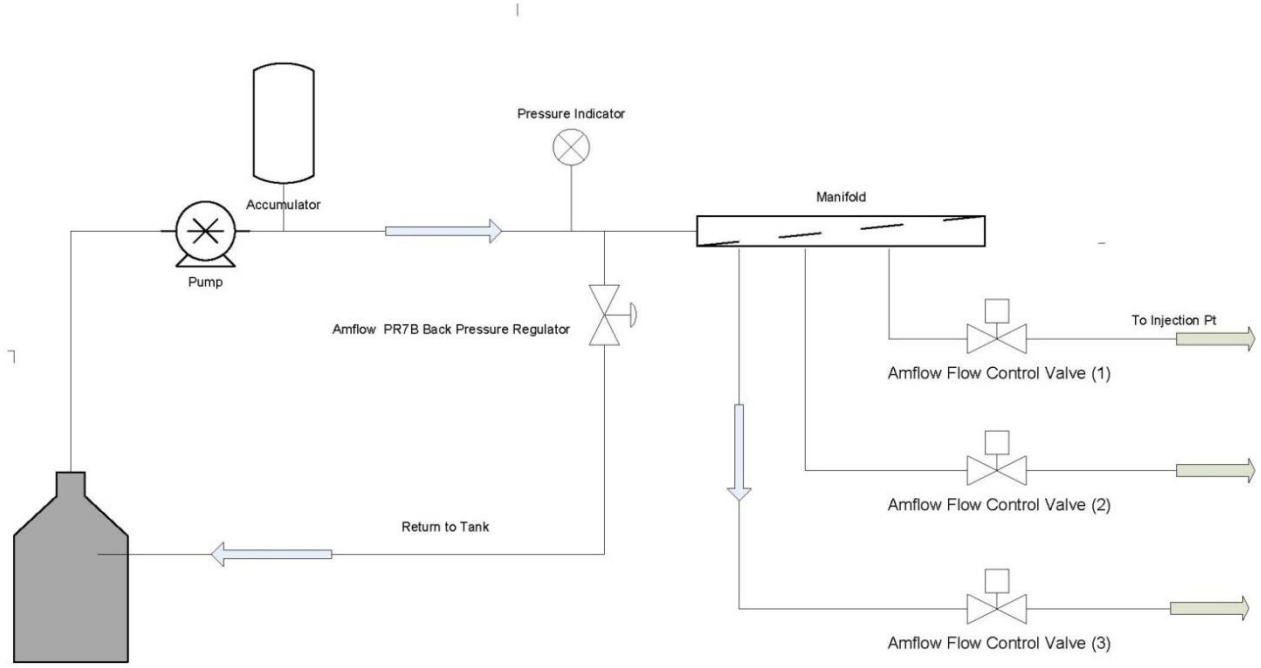
Step 5

- Use proper fitting adaptors on both “Inlet” and “Outlet” Ports that are suitable for application
  - (Reference ***Amflow®*** Build Data Sheet for port configuration)

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

2.02 ⚠ INSTALLATION PRECAUTIONS



⚠ CAUTION

This is a back pressure regulator and cannot be used as an in-line pressure regulator

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

SECTION 3: OPERATION

- System pressure control is governed by turning ADJUSTMENT HANDLE (Item 23) clockwise.
  - Adjustment will increase set pressure.

- Action of ADJUSTMENT HANDLE (Item 23) alters position of SEAT (Item 24) relative to PIN (Item 5).
  - This movement either increases or decreases the flow restriction.

- As process liquid enters Inlet Port, the pressure rise changes the position of PIN (Item 5) relative to SEAT (Item 24).
  - This pressure rise is the opposed force of BELLEVILLE SPRINGS (Item 25).

- When system pressure rises above set point, PIN (Item 5) lifts from SEAT (Item 24).
  - This allows process liquid to enter through orifice in SEAT HOLDER (Item 3), and to exit Back Pressure Regulator via Outlet Port

- As pressure in system decreases, the pre-set force on BELLEVILLE SPRINGS (Item 25) overcomes lifting forces, allowing PIN (Item 5) to re-locate in SEAT (Item 24), and restrict the flow of process liquid.

The following seals keep the process liquid pressure from escaping into the atmosphere:

ATMOSPHERIC SEALS:

- STEM CUP SEAL (Item 12) seals between STEM (Item 7) and BODY (Item 1).
- PISTON CUP SEAL (Item 10) seals between PISTON (Item 2) and CARTRIDGE (Item 9).

CAUTION

Compatibility with fluid metered by valve must be considered when replacing any seal. Consult manufacturer for assistance in determining proper seal material selection.

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

SECTION 4: MAINTENANCE

4.01 DISASSEMBLY: Back Pressure Regulator

Step 1

- To remove ADJUSTMENT HANDLE (Item 23):
  - Remove M3 x 25 SHCS (Item 33) and M3 Lockwasher (Item 31) Ref. Picture 1
  - Remove ADJUSTMENT HANDLE (Item 23) Ref. Picture 2
  - Remove PANEL LOCK (Item 35) Ref. Picture 3

PICTURE 1

PICTURE 2

PICTURE 3

Step 2

- Remove STEM CLIP (Item 32), using a screwdriver. Ref. Picture 4, 5, 6

PICTURE 4

PICTURE 5

Step 3

- Remove CLIP WASHER (Item 17). Ref. Picture 4 & 6

PICTURE 6

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

Step 4

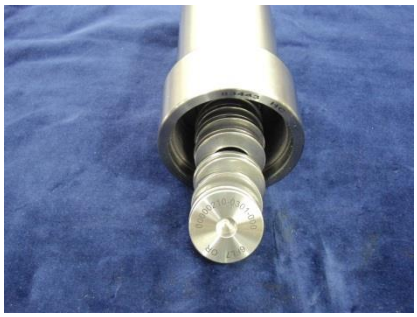
- Carefully remove SPRING CUP (Item 13) by unscrewing from BODY (Item 1). Ref. Pictures 7 & 8

PICTURE 7

PICTURE 8

Step 5

- Remove BELLEVILLE SPRINGS (Item 25) , and CARTRIDGE (Item 9) from SPRING CAP (Item 4). Ref. Picture 9 &10



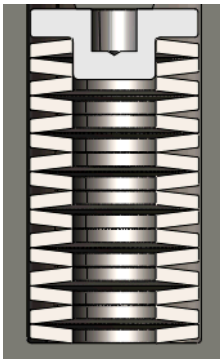
PICTURE 9

PICTURE 10

IMPORTANT

Please note configuration of springs.

Correct spring orientation is essential for proper operation of back pressure regulator.



NOTE

Reference “PR-HF-SSSP Build Data Sheet” supplied with order for spring configuration.

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

Step 6

- Pull PISTON (Item 2) straight out of BODY (Item 1) very carefully. Ref. Picture 11, 12, 13

PICTURE 11

PICTURE 12

PICTURE 13

CAUTION

Avoid damage to PISTON/PIN ASSEMBLY

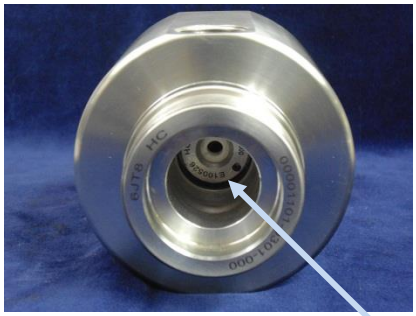
END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

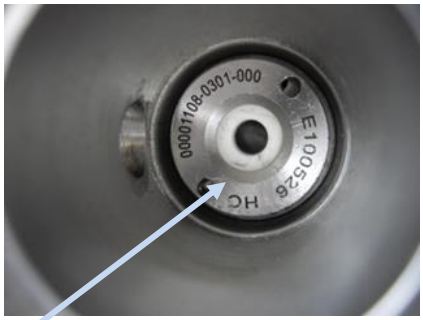
4.02 REMOVAL: Seat Sub-Assembly

Step 1

- Remove STOP RING (Item 16) before proceeding to Seat Sub-Assembly service. Ref. Picture 1, 2, 3



PICTURE 1



PICTURE 2

PICTURE 3

SEAT SUB-ASSEMBLY

Step 2

- Attach threaded end of STEM INSERTION TOOL Part: 00000212-1012-000 (Ref. Appendix A) Ref. Picture 4 onto STEM (Item 7).
  - Push STEM (Item 7) until Seat Sub-Assembly can be removed from BODY (Item 1). Ref. Picture 4,5,6

PICTURE 4

PICTURE 5

PICTURE 6

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

4.03 SERVICE: Seat Sub-Assembly

SEAT SUB-ASSEMBLY		
3	00001107-0301-000	Seat Holder
6	00001108-0301-000	Seat Retainer
15	00001104-0301-000	Pin Retainer
27	00001555-2023-101	Seat Holder O-Ring
28	00001555-8023-003	Seat Holder Back-Up Ring

SEAT SUB-ASSEMBLY

SEAT SUB-ASSEMBLY
Exploded View

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

Step 1

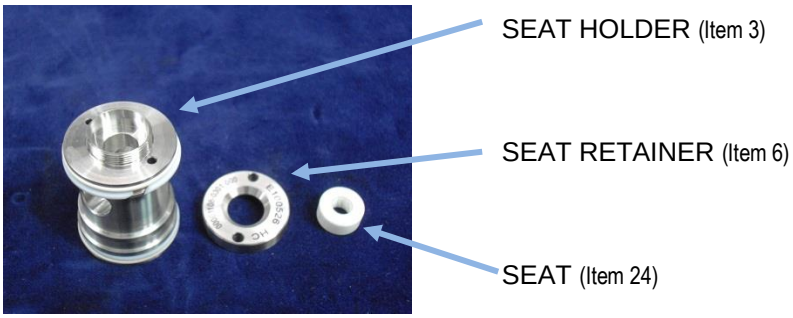
- Turn STEM (Item 7) clockwise to remove from Seat Sub-Assembly. Ref. Picture 1
  - Left hand thread design helps bind parts together for operations under high pressure.

PICTURE 1

Step 2

- Hold SEAT HOLDER (Item 3):
  - Unscrew SEAT RETAINER (Item 6) with a large screwdriver Ref. Picture 2 & 3

PICTURE 2



PICTURE 3

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

4.04 REPLACEMENT: Stem Cup Seal and Stem Rub Washer

Step 1

- Remove STEM CUP SEAL (Item 12) and STEM RUB WASHER (Item 8) from BODY (Item 1) using a sharp pointed tool. Ref. Picture 1

PICTURE 1

CAUTION

Use **extreme caution** when putting new STEM CUP SEAL (Item 12) and STEM RUB WASHER (Item 8) in BODY (Item 1).

Preferably, use a similar diameter rod to push in parts and make sure they sit flat inside BODY (Item 1).

NOTE:
Use O-Ring Lubricant on all O'Ring Surfaces

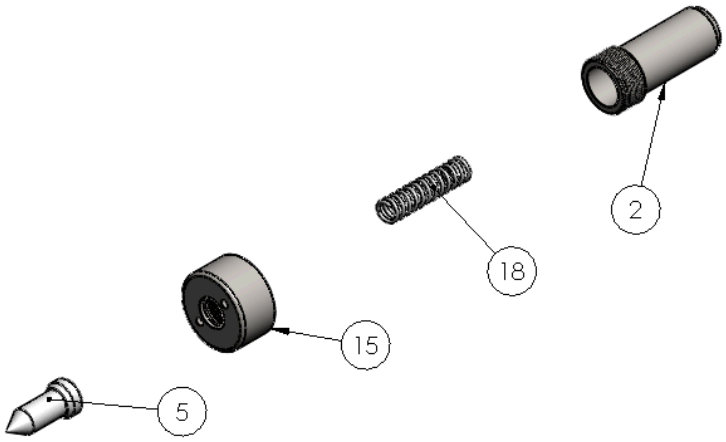
END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

4.05 SERVICE: Pin Sub-Assembly

PIN SUB-ASSEMBLY		
2	00001102-0301-000	Piston
5	00001091-0301-000	Pin
15	00001104-0301-000	Pin Retainer
18	00001120-0301-000	Pin Spring

PIN SUB-ASSEMBLY



PIN SUB-ASSEMBLY
Exploded View

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

Step 1

- Remove PISTON CUP SEAL (Item 10) from PISTON (Item 2). Ref. PICTURE 1 & 2

Step 2

- Place PISTON (Item 2) on vice.

IMPORTANT

Jaws of vice must be aluminum or a material that is softer than stainless steel to avoid damaging surface of PISTON (Item 2).

Step 3

- After PISTON (Item 2) is safely locked on vice:
  - Use a wrench to separate PIN RETAINER ASSEMBLY (Item 15) from PISTON (Item 2).
  - PIN ASSEMBLY (Item 5) should be able to easily slide out and be replaced. Ref. PICTURE 3

PICTURE 1

PICTURE 2

PICTURE 3

Step 4

- Re-assemble PIN RETAINER (Item 15) by reversing above procedure.

NOTE

Use Service Removable Loctite on threads of PIN RETAINER ASSEMBLY (Item 15) during re-assembling.

4.06 RE-ASSEMBLY: Back Pressure Regulator

- Re-assemble back pressure regulator by reversing steps 6.01 thru 6.04 of disassembly process.

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

SECTION 5: TROUBLESHOOTING

Amflow® Back Pressure Regulators may perform poorly or not work for a variety of reasons. Listed below are those most commonly encountered:

a. Springs installed incorrectly
b. Defective seat sub-assembly seals
c. Installed as an in-line filter rather than a “BPR” configuration
d. Isolation valve in wrong position
e. Pin broken
f. Seat broken
g. Seat size too small for application

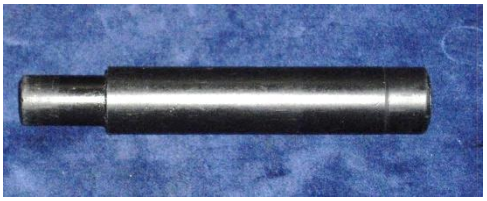
PROBLEM	PROBABLE CAUSE
No flow	c,e,f
Maximum flow rate not achievable	g
Pressure not stable	a,b,f,e
Unable to reach set-point	a,d

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

APPENDIX A
AMFLOW® TOOLS

Part: 00000212-1012-000
STEM INSERTION TOOL
Used to install and remove stem and seat assemblies



Part: 00000009-1010-000
CUP SEAL TOOL
Used to assemble Stem and Center Body

NOTE:
Contact manufacturer or manufacturer's representative to purchase specialized tools.

END OF SECTION

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

STANDARDS

A&H Enterprises designs its products to meet the applicable **ASME,** and **API** standards for back pressure regulator design and pressure vessels.

Products are also **CE** marked and **ATEX** approved for Hazardous area installations.

MEMBERSHIPS

Fieldbus Foundation MEMBER

HART COMMUNICATION FOUNDATION

CERTIFICATIONS

ATEX DIRECTIVE (94/9/EC)

In the interest of safety and quality, A&H Enterprises has certified its ***Amflow®*** series of back pressure regulators for use in potentially explosive atmospheres as defined by the ATEX Directive (94/9/EC) as Category 2G.

ATEX
CE Ex **II 2 G Ex d IIC T3**
US PATENTS 7,343,929 B2 & INTERNATIONAL PATENT PENDING

To ensure the safety of all parties, the back pressure regulators must be regularly checked for signs of fluid leaks. Only genuine ***Amflow®*** parts must be installed in accordance with supplied instructions, good engineering, and construction practices. Bodies are constructed from 316SS and, therefore, must not be used with chemicals which are incompatible with 316SS or with the seal materials used. The back pressure regulators must not be modified in any way from the original purchased back pressure regulators. The back pressure regulators must only be operated in the range of pressure and temperature conditions indicated on product data sheet. This equipment is certified for Group 2 Category II. Equipment should not be used in systems requiring a higher level of certification.

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

LIMITED WARRANTY

Each ***Amflow®*** product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is three (3) years and begins on the date of original purchase. This warranty extends only to the original buyer and does not apply to any product which, in A & H Enterprises' opinion, has been misused, altered, neglected, contaminated, damaged by accident or abnormal conditions of operation or handling.

At A & H Enterprises' option, the A & H Enterprises' warranty obligation is limited to the replacement or repair of a defective product that is returned to A & H Enterprises within the warranty period. Merchandise returned to A & H Enterprises within the warranty period, which in A & H Enterprises' opinion is defective by accident, improper operation or improper handling shall be subject to a charge for repair. Merchandise, free from defects, returned to A & H Enterprises shall be subjected to a 20% restocking fee within thirty (30) days of the purchase date. Written authorization is required for all merchandise returned to A & H Enterprises.

To obtain warranty service, contact A & H Enterprises to obtain return authorization information. Then send the product to A & H Enterprises with a description of the difficulty, transportation and insurance prepaid. A & H Enterprises assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation and insurance prepaid. If A & H Enterprises determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, A & H Enterprises will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer, transportation and insurance prepaid, and the Buyer will be billed for the repairs and the return transportation and insurance charges.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. A & H ENTERPRISES SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY.

Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of the Warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

Copyright© 2015 A & H Enterprises, Inc. All rights reserved
US Patent 7,343,929 B2 & International Patent Pending

REPRESENTATIVES

AMFLOW® NORGE

Norway, Sweden, Denmark, Netherlands, Germany, U.K., Italy

Prinsens vei 12
4315 Sandnes
Norway

Telephone: +47.922.19.656
Fax: +47.520.00.591
E-mail: leif.egil.pettersen@amflow.no

AMFLOW CONTROLS ASIA SDN. BHD.

Malaysia, Indonesia, Singapore, India, Thailand, Vietnam

No. 1701 Block 1, TTDI ADINA
Jalan Judo 13/45, Seksyen 13
40675 Shah Alam, Selangor
Malaysia

Telephone: (+603) 5523.8418
Mobile: (+6012) 3323.118
E-mail: amflowcontrols@gmail.com

SUDIFLOW INTERGRATED SERVICES, LTD.

Nigeria

25 Elelenwo Road
Port Harcourt,
Nigeria

Telephone: +234.803.309.1405, +705.679.4894
E-mail: sudiflow@yahoo.com

PROPRIETARY DISCLOSURE NOTICE:

This material contains proprietary information belonging to A & H Enterprises, Inc., and may not be disclosed, in whole or in part, without express written permission of A & H Enterprises, Inc.

Copyright© 2015 A & H Enterprises., Inc.
All rights reserved